

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE July 19, 2004
BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of: Steinberg et al. : Group Art Unit: 3726
Serial No.: 09/923,842 : Examiner: David P. Bryant
Filed: August 7, 2001 : Docket: 03-18 (ACT 230)
For: ALIGNMENT APPARATUS AND METHOD : DN 52008
FOR ALIGNING STACKED DEVICES :

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APPLICANTS' APPEAL BRIEF

Introduction

This appeal is from the Primary Examiner's final rejection, dated October 14, 2003, in the above-identified patent application.

1. Real Party In Interest

The real party in interest is Assignee, Rohm and Haas Electronic Materials, LLC of Marlborough Massachusetts.

2. Related Appeals and Interferences

Applicants do not know of any appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in the present appeal.

3. Status of Claims

Claims 1-11 and 18-22 are pending in this application. All of the pending claims stand finally rejected; no claim is allowed. Claims 12-17 and 23 have been canceled. The claims to be considered on appeal, therefore, are claims 1-11 and 18-22. These claims are rejected under 35 U.S.C. 103(a) over "Applicant's admitted prior art (AAPA) in view of Lehman et al. (U.S. Patent No. 6,095,697)" as stated in the Final Office Action at page 3, first paragraph.

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4. Status of Amendments

In the Amendment and Response mailed January 14, 2004, Applicants amended claim 21 to incorporate features recited in the preamble of the claim into the body of the claim. This amendment was made to put the application in better form for appeal. An Advisory Action dated February 4, 2004 acknowledged the proposed amendment and indicated that the proposed amendment would be entered for purposes of appeal.

Applicants have also recently noted that a typographical error was made in the listing of claims 1 and 18 in the Amendment and Response mailed January 14, 2004. At line 10 of claim 1 the word "comprising" was inadvertently omitted after the phrase "said second substrate". The previous version of claim 1 read "said second substrate comprising a periphery...". At line 14 of claim 18 the word "one" was inadvertently omitted before the word "another", which was present in claim 18 at the time of filing. Applicants draw the Examiner's and Board's attention to the correct reading of claims 1 and 18.

The claim listing in the appendix reflects the claim 21 amendment and correction to omissions in claims 1 and 18 as described above.

5. Summary of the Invention

Applicants' invention relates to "an apparatus and method for aligning micro-components disposed on substrates having patterned surfaces that do not oppose or 'face' each other." (Specification page 15, first line.) In this regard, "structures and methods for precisely aligning substrates (and the micro-components disposed thereon) [are provided] which lack complimentary [sic] interfacing/ inter-engaging surfaces or features." (Specification page 1, second paragraph.)

For example, as illustrated in one exemplary embodiment shown in Fig. 4, the present invention provides an apparatus for aligning a first substrate 20 having at least one micro-component, *e.g.*, micro-lenslet 50, relative to at least one micro-component, *e.g.*, micro-channel 60, of a second substrate 30. Each of the substrates 20, 30 includes a front surface oriented in the same direction, *e.g.*, front surfaces 24, 34 facing in the upper direction as shown in Fig. 4. Significantly, the facing surfaces 26, 34 of the first and second substrates 20, 30 do not comprise complementary interfacing/inter-engaging surfaces. Of particular significance is that the

“facing” rear surface 26 of the first substrate 20 need not be patterned to provide alignment between the first and second substrates 20, 30.

In order to provide alignment between the first and second substrates 20, 30, an alignment member 10 is provided, optionally in the form of a third substrate as illustrated in Fig. 4. The first substrate 20 is disposed between the alignment member 10 and the second substrate 30. The second substrate 30 includes a periphery which extends beyond the first substrate 20. The second substrate 30 also includes at least one depression 32 on the front surface 34 which is disposed within the periphery of the second substrate 30.

The alignment member 10 includes a first depression 12b which mechanically engages one end of a first alignment element 40b. The first alignment element 40b has an opposite end which engages the depression 22 disposed on the front surface 24 of the first substrate 20. Simultaneous engagement of the first alignment element 40b in the respective depressions 12b, 22 of the alignment member 10 and first substrate 20 effects alignment of the first substrate 20 with the alignment member 10.

The alignment member 10 also includes at least one second depression 12a which mechanically engages one end of a second alignment element 40a. The second alignment element 40a has an opposite end which engages the depression 32 disposed on the front surface 34 of the second substrate 30. Simultaneous engagement of the second alignment element 40a in the respective depressions 12a, 32 of the alignment member 10 and second substrate 30 effects alignment of the second substrate 30 with the alignment member 10. Thus, the first and second depressions 12a, 12b and the alignment elements 40a, 40b cooperate to passively align the substrates 20, 30 to one another so that the micro-components 50, 60 are aligned. The configuration provided by Applicants’ invention permits the substrates 20, 30 to be aligned to one another without the need for the rear surface 26 of the first substrate 20 to be patterned. Thus, Applicants’ invention avoids structures which include complementary interfacing/ inter-engaging surfaces or features and so avoids problems recognized by Applicants as being associated therewith. The significance of the advantages provided by Applicants’ invention can be understood by reference to Figs. 1 and 2 found in the specification.

For example, with reference to Fig. 1, an arrangement is shown for aligning two silicon chips 20 and 30. In this arrangement, two facing surfaces 24, 34 are patterned to include complementary

pits, grooves, cavities or patterns 22 and 32 into which one or more alignment spheres 40, *e.g.*, a ball lens, may be interdisposed. However, Applicants teach in the specification that such a configuration may not be desirable for aligning two substrates each having a micro-component disposed thereon, such as the two substrates of Fig. 2.

Fig. 2 of the specification illustrates two substrates 20, 30 to be aligned so that a micro-lens 50 of the first substrate 20 is aligned with a groove 32 of the second substrate 30. It is important to note that no alignment mechanism is shown in Fig. 2. Fig. 2 merely illustrates the problem to be solved by Applicants' invention: "FIG. 2 illustrates the inherent frustrations associated with precisely aligning microelectronic, micro-mechanic and micro-optic components on substrates which do not have opposing surfaces, *i.e.*, so called 'frontside to backside' alignment. As can be appreciated, aligning the micro-lenses 50 on substrate 20 with the grooves 32 of substrate 30 requires backside alignment on the lens substrate 20." (Specification, page 4, last paragraph.)

Applicants have recognized that such an arrangement is problematic, because it is necessary to precisely align the rear surface 26 features (*e.g.*, pits) to the front surface features (micro-lenses 50), and such alignment on opposing surfaces of a substrate 20 can be quite difficult, especially to the tolerances often encountered in micro-optical systems. "Typically, alignment tolerances for corresponding micro-mechanical, microelectrical and micro-optical components are on the order of about 1 micron (or better) for achieving optimum communication between components." (Specification, page 4, last paragraph.)

Hence, Applicants have overcome the problems associated with the alignment approach in Fig. 1 by providing "structures and methods which precisely align microelectronic, micro-mechanical and micro-optical components disposed on one or [more] substrates [but] which do not include mechanically-patterned or mechanically inter-engagable opposing surfaces." (Specification, page 5, first paragraph.)

6. Issue

Did the Examiner err in rejecting claims 1–11 and 18–22 as unpatentable under 35 U.S.C. 103(a) over "Applicant's admitted prior art (AAPA) in view of Lehman et al. (U.S. Patent No. 6,095,697)"?

7. Grouping of Claims

Although claims 1–11 and 18–22 are rejected on the same ground, Applicants are not satisfied to let claims 1–11 and 18–22 stand or fall together on Appeal. Rather, the claims stand or fall together according to the following grouping for the reasons provided under “8. Argument”, *infra*.

Group 1: claims 1–4.

Group 2: claim 5.

Group 3: claim 6.

Group 4: claim 7–10.

Group 5: claim 11.

Group 6: claim 18–20.

Group 7: claims 21–22.

8. Argument

The rejections of the pending claims under 35 U.S.C. 103(a) cannot be maintained as there is no suggestion or motivation provided, either by the references relied on by the Examiner or by knowledge generally available to one of ordinary skill in the art, to modify such references or to combine the disclosures thereof in the manner proposed by the Examiner.

According to section 706.02 (j) of the MPEP, three basic criteria must be met in order for an examiner to establish a *prima facie* case of obviousness under 35 U.S.C. 103. These criteria are enumerated as follows:

(i) There must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine the reference teachings;

(ii) there must be a reasonable expectation of success; and

(iii) the prior art reference (or references when combined) must teach or suggest all the claim limitations.

Section 706.02 (j) of the MPEP also provides that the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art

and not be based on applicant's disclosure, citing In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

In the present case, the rejections under 35 U.S.C. §103(a) do not meet the above criteria and so a *prima facie* case of obviousness has not been made. Instead, the Examiner improperly uses Applicants' disclosure as a roadmap to select and combine disparate features allegedly present in the references in an attempt to re-create Applicants' invention. Applicants respectfully submit that the rejection of the pending claims is improper and should be reversed by the Board for at least the reasons that Lehman teaches away from making the proposed combination, that the proposed modification would render Lehman less suited for its intended purpose, and that the Examiner has engaged in impermissible hindsight reconstruction.

A. Respecting Group 1: Claims 1–4

For purpose of the appeal, Applicants are satisfied to let claims 2– 4 stand or fall together with claim 1 from which they depend. Applicants submit that claims 1–4 are separately patentable from the other pending claims for the reasons set forth below.

A.1. The Examiner's rejection of claim 1 fails to establish a *prima facie* case of obviousness, in part because the Examiner has failed to provide the required evidentiary showing as to *why* one skilled in the art would combine the applied "references".

In order to reject Applicants' claims 1–4 under 35 U.S.C. 103(a), the Examiner must establish a *prima facie* case of obviousness. In re Geiger, 815 F.2d 686, 688, 2 USPQ2d 1276, 1278 (Fed. Cir. 1987). The consistent criteria for determination of obviousness is whether the prior art would have suggested to one of ordinary skill in the art at the time the invention was made to arrive at Applicants' claimed invention. In re Hedges, 783 F.2d 1038, 1041, 22 USPQ2d 1436, 1438 (Fed. Cir. 1987); Orthopedic Equipment Co. v. United States, 702 F.2d 1005, 1012, 217 USPQ 193, 200 (Fed. Cir. 1983); In re Reinart, 189 USPQ 143, 148 (CCPA 1976). "To support the conclusion that the claimed combination is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed combination or the Examiner must present a convincing line of reasoning as to why the artisan would have found claimed invention to have been obvious in light of the teachings of the references." Ex parte Clapp, 227 USPQ 972 (BPAI 1985) . Only if this

burden is met is the burden of coming forward with rebuttal argument or evidence shifted to the Applicants. In re Rijckaert, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993). When the references cited by the Examiner fail to establish a *prima facie* case of obviousness, the rejection is improper and must be overturned. In re Fine, 837 F.2d 1071, 1075, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988).

In the instant case, the Examiner rejected claims 1–11 and 18–22 under 35 U.S.C. 103(a) as being unpatentable over AAPA (“Applicants Admitted Prior Art” as termed by the Examiner, *i.e.*, Figures 1 and 2 and associated text) in view of Lehman, as argued at page 3 *et seq.* of the Office Action dated October 14, 2003 (Final Action). In doing so, the Examiner first acknowledged that AAPA failed “to teach a micro-chip assembly, an aligning apparatus,... each having a front surface facing the same direction and at least one depression thereon for engagement with at least one alignment element.” (Final Action, page 3, third paragraph.) Then, in the next paragraph the Examiner recited various features allegedly present in Lehman. (Final Action, page 3, fourth paragraph.) Then, with no further analysis or reasoning, the Examiner immediately concluded that “[i]t would have been obvious to one of ordinary skill in the art of the time the invention was made to have provided the second substrate with a periphery which extends beyond the periphery of the first substrate, and to have used an alignment device in conjunction with positioning features on the first and second substrates, as taught by Lehman et al., to provide the necessary backside alignment between micro-lenses 50 and grooves 32.” (Final Action, page 4, first full paragraph.) Applicants respectfully submit that such a showing by the Examiner fails to satisfy the evidentiary burden for making a *prima facie* case of obviousness under well-established law.

Specifically, the Examiner’s statement that “[i]t would have been obvious to one of ordinary skill in the art of the time the invention was made to have ...” is mere conclusion that fails to provide the required “convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious.” “Combining prior art references without evidence of such a suggestion, teaching, or motivation simply takes the inventor’s disclosure as a blueprint for piecing together the prior art to defeat patentability — the essence of hindsight.... Broad conclusory statements regarding the teaching of multiple references, standing alone, are not ‘evidence.’” In re Dembiczak, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999). (Citations omitted.) (Emphasis added.). “When the incentive to combine the teachings of the references is not readily

apparent, it is the duty of the Examiner to explain why combination of the reference teachings is proper. In other words, the examiner must indicate the reasons *why* one skilled in the art would have [made the combination]. Absent such reasons or incentives, the teachings of the references are not combinable.” Ex parte Skinner, 2 USPQ 2d 1788, 1790 (BPAI 1986)(citations omitted) (Underlining added. Italics in original.).

In the Final Action, the Examiner presents no explanation *why* one skilled in the art would have made the combination of AAPA and Lehman. Instead, the Examiner merely asserts that a person of ordinary skill in the relevant art would have been able to arrive at the claimed invention. In so stating this ground of rejection, the Examiner assumes that which § 103 requires to be proved, namely, that there is motivation provided by the prior art to cause the skilled artisan to do what Applicants have done. The Examiner’s conclusory statement simply begs the question. This Board has repeatedly failed to uphold rejections based on mere conclusion, *e.g.*:

the examiner may provide an explanation based on logic and sound scientific reasoning that will support a holding of obviousness... [However] the examiner’s comments regarding obviousness amount to an assertion that one of ordinary skill in the relevant art would have been able to arrive at the appellant’s invention because he had the necessary skills to carry out the requisite process steps. This is an inappropriate standard for obviousness. Ex parte Levengood, 28 USPQ2d 1300, 1301 (BPAI 1993)(citations omitted).

Since, the Examiner failed to supply a convincing line of reasoning, and, for the reasons set forth below, the “references” do not expressly or impliedly suggest combination to arrive at Applicants’ invention, the Examiner’s rejections of claims 1 –4 fails to establish a *prima facie* case of obviousness.

A.2. The Examiner’s rejection of claim 1 fails to establish a *prima facie* case of obviousness, as there is no motivation to combine AAPA with Lehman, because Lehman *teaches away* from combination to recreate Applicants’ invention and modification of Lehman would render it *unsuited for its intended purpose*.

In attempting to combine the disclosures of AAPA and Lehman, the Examiner appears to have disregarded long-standing authority, such as In re Ehrreich, 590 F.2d 902, 909, 200 USPQ 504, 510 (CCPA 1979), which requires that in determining obviousness under 35 U.S.C. 103, the focus

must be on what the references would collectively suggest in their entirety to one of ordinary skill in the art. Indeed, as the court stated in In re Wesslau, 353 F.2d 238, 241, 147 USPQ 391, 393 (CCPA 1965), “[i]t is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one skilled in the art.”

When the entirety of the disclosures provided by AAPA and Lehman is properly considered, it is quite clear that these references not only fail to provide a suggestion or motivation for combination, but actually teach away from Applicants’ claimed invention, in light of the disclosure in Lehman that the header/fixture 26 should not interengage with the chip 25. In the Final Action, the Examiner implies that he is relying on the header/fixture 26 to supply the third substrate of claim 1 and completely absent from AAPA. (Final Action, page 3, last paragraph *et seq.*)

Lehman specifically teaches away from having the header/fixture 26 interengage with the chip 25, in order to overcome the problem that Lehman identifies and addresses. Lehman explains that “[c]hip 13 may or may not be securely attached to mount or holder 19. ... Such alignment is not rigid because chip 13 is fragile, and harsh movement of header 14 relative to chip 13, may break or dislodge guide 15 or key 16, or the connection or adhesion that maintains alignment of registration mark 17 and site 18. Also, chip 13 may be easily shifted or detached from holder 19, as all of the force or disturbance of header 14 would be transferred to chip 13.” (Column 2, lines 38–49.) In other words, Lehman teaches that movement of the prior art header 14 can cause the chip 13 to detach from the holder 19 due to the interconnection of the header 14 to the chip via the guide 15 or key 16. Hence, Lehman teaches that its goal is to provide a “rigid alignment of a fixture connection to a chip having the rigidity of the connection [with the fixture/header] transferred from the chip to a chip holder. ... [so that] Stresses applied to the device fixture are transferred to the chip holder via the fastener, and not to the chip.” (Abstract, first sentence and last sentence. Emphasis Added.)

In contrast, claim 1 recites “a first substrate [20] comprising ... at least one depression [22] for mechanically engaging one end of the first alignment element [40b],...a third substrate [10] comprising first ... depression[s] [12b] disposed thereon for engaging the opposite ends of the first ... alignment element[s]; wherein said first substrate [20] is disposed between said second substrate [30] and said third substrate [10].” (The reference numerals included in the quoted claim language

are provided for illustration purposes only and refer to like numbered elements in the exemplary embodiment of Fig. 4 and are not intended to limit the interpretation of claim 1.) Thus, the first substrate 20 and third substrate 10 have opposing depressions into which an alignment element is seated so that the first and third substrates are interengaged contrary to the express teaching of Lehman. Thus, Lehman teaches away from Applicants' claimed "at least one depression" in the first substrate and "first depression" in the third substrate, each depression for "engaging one end of the first alignment element." When a claim recites doing what a reference tries to avoid to prevent unacceptable results, "this is the very antithesis of obviousness", indicating the un-obviousness of Applicants' invention. Application of William J. Buehler, 515 F.2d 1134, 1141, 185 USPQ 781, 787 (CCPA 1975).

Furthermore, to modify Lehman to provide such structures as recited in claim 1 would render Lehman less suited for its intended purpose of preventing transfer of stress from the device fixture to the chip, since the modified structure would transfer stress from the device fixture to the chip. A modification that renders a reference less suited for its intended purpose is never obvious. In re Gordon, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984).

The conclusion is inescapable, therefore, that an objective reading of Lehman and AAPA would not lead one skilled in the art to arrive at Applicants' claimed invention. Thus, for at least these reasons, it must be concluded that there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine the reference teachings in the manner proposed by the Examiner. Hence, a *prima facie* case of obviousness has not been established in the instant case.

A.3. The Examiner's rejection of Claim 1 further fails to establish a *prima facie* case of obviousness, rather the Examiner used Applicants' disclosure as a roadmap to arrive at Applicants' invention as evidenced by the targeted selection/ modification of components from Lehman for insertion into AAPA.

"Measuring a claimed invention against the standard established by section 103 requires the oft-difficult but critical step of casting the mind back to the time of invention, to consider the thinking of one of ordinary skill in the art, guided only by the prior art references and the then-accepted wisdom in the field. Close adherence to this methodology is especially important in

the case of less technologically complex inventions, where the very ease with which the invention can be understood may prompt one ‘to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher.’” Dembiczak at 999, 1617. (Citations omitted.) The Examiner must look at the situation as if he did not already know the answer as disclosed by Applicants.

Applicants respectfully submit that in the instant case the Examiner fell into the insidious hindsight trap as further evidenced by the targeted, out-of-context selection of components from Lehman for insertion into AAPA, indicating that Applicants’ claim 1 which was used as a blueprint in guiding the selection process. Specifically, the Examiner has selectively picked and chosen disparate features of Lehman, out of the context in which the features are found, and inserted them into AAPA to reproduce Applicants’ claimed invention. This out-of-context selection of features is a consequence of the lack of suggestion or motivation to make the proposed combination so evidently present in the instant case. However, it is well established that a claim cannot properly be used as a “blueprint” for “abstracting” individual teachings from references. Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 297, 227 USPQ 657, 667 (Fed. Cir. 1985). Yet, this is what has been done in the instant case. The Examiner has used Applicants’ own disclosure as a blueprint to recreate Applicants’ claimed invention.

Specifically, in attempting to combine the “references” the Examiner states that “[i]t would have been obvious ... to have provided the second substrate with a periphery which extends beyond the periphery of the first substrate, and to have used an alignment device in conjunction with positioning features on the first and second substrates, as taught by Lehman et al., to provide the necessary backside alignment between micro-lenses 50 and grooves 32 [shown in Fig. 2].” (Final Action, page 4, first full paragraph.) Thus, the Examiner has modified the disclosure of Fig. 2 in view of the teaching of Lehman. However, much of the structure recited in claim 1 is absent from Fig. 2, much more than is indicated by the Examiner when he stated that “simply stated, AAPA fails to teach a micro-chip assembly, an aligning apparatus... each having a front surface facing the same direction and at least one depression thereon for engagement with at least one alignment element.” (Final Action, page 3, third paragraph.)

For example, Fig. 2 fails to disclose at least the following six features recited in claim 1: (1) “a first substrate comprising a front surface ... comprising at least one micro-component disposed

thereon and at least one depression for mechanically engaging one end of the first alignment element”; (2) “a second substrate comprising a front surface ... comprising at least one micro-component disposed thereon and at least one depression for mechanically engaging one end of the second alignment element”; (3) “said second substrate [comprising] a periphery which extends beyond the periphery of said first substrate”; (4) “a third substrate” of any type; (5) said third substrate “comprising first and second depressions disposed thereon for engaging the opposite ends of the first and second alignment elements”; and, (6) that “said first substrate is disposed between said second substrate and said third substrate...whereby said first and second substrates are passively aligned.” Hence, in accordance with section 706.02(j) of the MPEP each of the six aforementioned deficiencies in Fig. 2 must be provided by the secondary reference Lehman so that the proposed combination of Fig. 2 with Lehman teaches or suggests all the claim limitations.

With regard to Lehman, Applicants respectfully submit that the majority of the aforementioned six elements, as quoted, are not present in Lehman. Rather, targeted portions of Lehman must be abstracted out of context in order to find the parts the Examiner needs to insert into Fig. 2 to arrive at the invention of claim 1. First, the Examiner alleges that Lehman discloses “a first substrate 25”. (Final Office Action, page 3, third paragraph.) However, claim 1 recites “a first substrate ... comprising at least one micro-component disposed thereon and at least one depression for mechanically engaging one end of the first alignment element.” The chip 25 of Lehman fails to disclose or suggest the claimed “at least one depression for mechanically engaging one end of the first alignment element”, which feature is also missing from the structure of Fig. 2.

Second, Lehman does not disclose “a second substrate comprising a front surface which faces the first direction, the front surface comprising at least one micro-component disposed thereon and at least one depression for mechanically engaging one end of the second alignment element” as claimed by Applicants. The Examiner alleges that Lehman discloses “a second substrate 19”. (Final Office Action, page 3, third paragraph.) However, the holder 19 of Lehman does not disclose or suggest Applicants’ claimed second substrate for at least the reason that the holder 19 of Lehman does not comprise “at least one micro-component disposed thereon” as recited in claim 1. Third, since Lehman fails to disclose Applicants’ claimed second substrate, it also follows that Lehman fails to disclose or suggest Applicants’ claimed second substrate “[comprising] a periphery which extends beyond the periphery of said first substrate.” To identify an extended periphery on a part

in Lehman which contains no micro-component, and for which there is no suggestion or reason for it to contain a micro-component, is a prime example of out-of-context selection using Applicants' disclosure as a roadmap.

Fourth, Lehman fails to disclose or suggest Applicants' claimed "third substrate comprising first and second depressions disposed thereon for engaging the opposite ends of the first and second alignment elements." Contrary to the position of the Examiner which appears to equate the dummy header 20 of Lehman with Applicants' claimed third substrate, the dummy header 20 of Lehman cannot be Applicants' third substrate as claimed for at least the reason that the dummy header 20 does not comprise "first and second depressions disposed thereon for engaging the opposite ends of the first and second alignment elements" as recited in claim 1. Thus, Lehman fails to supply Applicants' claimed third substrate, which is missing from Fig. 2 of Applicants' specification. For these reasons, the Examiner is forced to engage in targeted selection and/or modification of subcomponents of Lehman to derive the needed elements for insertion into Fig. 2.

For example, in order to modify Fig. 2 of AAPA in the manner suggested by the Examiner, one would first have to modify the second substrate 30 of Fig. 2 to provide a periphery that extends beyond the periphery of the first substrate 20 based on the so-called "second substrate 19" of Lehman. Then, one would have to provide "at least one depression" on the second substrate 30 on the same surface 34 as the grooves 32 to arrive at Applicants' "second substrate comprising a front surface which faces a first direction, the front surface comprising at least one micro-component disposed thereon and at least one depression for mechanically engaging one end of the second alignment element, said second substrate [comprising] a periphery which extends beyond the periphery of said first substrate." Applicants respectfully submit that there is no suggestion or motivation to make such a combination.

Certainly, AAPA fails to suggest a second substrate "comprising a periphery which extends beyond the periphery of said first substrate." In addition, the holder 19 of Lehman comprises no micro-component, and so there is no suggestion in Lehman either to provide an extended periphery on a substrate comprising a micro-component. Hence, there is no suggestion provided in the references to provide a second substrate "comprising at least one micro-component disposed thereon and at least one depression for mechanically engaging one end of the second alignment

element, said second substrate [comprising] a periphery which extends beyond the periphery of said first substrate” as claimed by Applicants.

Still further, according to the Examiner, one would have to conclude based only on the disclosures of AAPA and Lehman that it would be advantageous to add a third substrate to AAPA based on the disclosure of the dummy header 20 of Lehman. And, moreover, the dummy header of Lehman 20 would have to further be modified to provide it with “first and second depressions disposed thereon for engaging the opposite ends of the first and second alignment elements” in order to arrive at Applicants’ claimed third substrate. This Board has made clear that

[t]he mere fact that a worker in the art could rearrange the parts of the reference device to meet the terms of the claims on appeal is not by itself sufficient to support a finding of obviousness. The prior art must provide a motivation or reason for the worker in the art, without the benefit of the appellant's specification, to make the necessary changes in the reference device. Ex parte Chicago Rawhide Manufacturing Company, 226 USPQ 438, 440 (PTO Bd. App. 1984).

Yet, the rejection of claims 1–4 in the instant case amounts to nothing more than a hindsight rearrangement of selected parts of the “references.” It stretches credibility to argue that a person skilled in the art and cognizant only of Lehman and AAPA – and not Applicants’ own disclosure – would arrive at Applicants’ claimed invention. Rather, it seems clear in view of the absence of aforementioned claim features in Lehman and AAPA that the Examiner has merely used Applicants’ own claim as a roadmap to pick and choose elements from Lehman for insertion into the structure of AAPA to arrive at the claimed invention. Nowhere in AAPA is it disclosed or suggested to make the types of modifications proposed by the Examiner, as explained above. Citing references which merely indicate that isolated elements and/or features recited in claims are known is not a sufficient basis for concluding that the combination of claimed elements would have been obvious. Ex parte Hiyamizu, 10 USPQ2d 1393, 1394 (PBAI 1988). The Examiner has not pointed to any text in either reference or general knowledge of one skilled in the art that would suggest the proposed combination.

One must therefore conclude that an objective reading of AAPA and Lehman would not have led one of ordinary skill in the relevant art to arrive at Applicants’ invention. In sum, the only document which suggests Applicants’ claimed invention is Applicants’ disclosure. In order to reject Applicants’ claims, there must be some reason, suggestion, or motivation provided by AAPA or

Lehman, *not Applicants*, to make the proposed modification. This knowledge cannot come from Applicants' own disclosure. Diveritech Corp. v. Century Steps, Inc., 850 F.2d 675, 678-679, 7 USPQ 2d 1315, 1318 (Fed. Cir. 1988); In re Oetiker, 977 F.2d 1443, 1447, 24 USPQ 1443, 1446 (Fed. Cir. 1992).

As recognized by the Federal Circuit:

Even when a claimed invention involves only the physical insertion of one reference's component into another reference's composite, such simplicity alone is not determinative of obviousness." See In re Oetiker, 977 F.2d 1443, 1447, 24 USPQ2d 1443, 1446 (Fed. Cir. 1992) ("Simplicity is not inimical to patentability.") The Gentry Gallery Inc. v. The Berkline Corp., 134 F.3d 1473, 45 USPQ2d 1498, 1502 (Fed. Cir. 1998).

The mere fact that a prior art structure could be modified does not make such a modification obvious unless the prior art suggests the desirability of doing so. Gordon at 902, 1147.

For all the above reasons, Applicants maintain that the Examiner has failed to make a *prima facie* case for obviousness. Only if this burden is met does the burden of coming forward with rebuttable argument or evidence shift to Applicants. Rijckaert at 1532, 1956. When the references cited by the Examiner fail to establish a *prima facie* case of obviousness, the rejection is improper and must be overturned. Fine at 1598. Accordingly, Applicants respectfully request that the Board reverse the Examiner's rejection of claim 1 as well as claims 2-4 which depend therefrom.

B. Respecting Group 2: claim 5

The Examiner's rejection of claim 5 fails to establish a *prima facie* case of obviousness, because the proposed combination of "references" fails to disclose each and every element recited in claim 5.

Applicants submit that claim 5 is separately patentable from the other pending claims for the following reasons. Claim 5 depends from claim 1 and further recites that "at least one of said depressions of at least one of said first substrate, said second substrate and said third substrate is defined between two raised surfaces." Neither Lehman nor AAPA discloses such a feature. Thus, the proposed combination fails to disclose all the features of claim 5, and therefore fails to satisfy a *prima facie* case of obviousness under 35 U.S.C. 103(a) as recited in MPEP section 706.02 (j), quoted above. Indeed, the Office Action fails to address this feature of claim 5 and fails to meet the burden for making a rejection under 35 U.S.C. 103(a). Only if this burden is met does the burden

of coming forward with rebuttable argument or evidence shift to Applicants. Rijckaert at 1532, 1956 (Fed. Cir. 1993). Applicants further assert that claim 5 is allowable as depending from an allowable base claim. For the reasons stated herein, Applicants respectfully request that the Board reverse the Examiner's rejection of claim 5.

C. **Respecting Group 3: claim 6**

The Examiner's rejection of claim 6 fails to establish a *prima facie* case of obviousness, because the proposed combination of "references" fails to disclose each and every element recited in claim 6.

Applicants submit that claim 6 is separately patentable from the other pending claims for the following reasons. Claim 6 depends from claim 1 and further recites that "at least one of said depressions of at least one of said first substrate and said second substrate is defined between two raised surfaces". Neither Lehman nor AAPA discloses such a feature. The Examiner stated that the "limitations in claims 6 and 11 are deemed to have been obvious matters of design choice, since applicant has not disclosed that depressions created by raised surfaces solves any stated problem attributable to micromachined grooves, and it appears that depressions in either form would perform equally well."

In this regard the Federal Circuit has held that "[w]e have found no cases supporting the position that a patent applicant's evidence and/or arguments traversing a § 103 rejection must be contained within the specification" and that a "finding of 'obvious design choice' [is] precluded where the claimed structure and the function it performs are different from the prior art." In re Chu, 66 F.3d 292, 299, 36 USPQ2d 1089, 1095 (Fed. Cir. 1995) (Citations omitted.).

In the instant case, Applicants have disclosed in Fig. 9 and the associated text at page 17, first paragraph that a depression "defined between two raised surfaces", such as depression 22, is a different structure from that shown in the alleged prior art, *i.e.*, Lehman and AAPA. Furthermore, the depression defined between two raised surfaces provides a different function from the depressions of Fig. 1.. For example, with reference to Fig. 1 of the specification, the ball lens 40 seats at a level below that of the upper surface 34 of the substrate 30. In contrast, the depression illustrated in Fig. 9 functions to permit the alignment element 40b to seat at the level of the upper surface of the substrate 20. Thus, since "the claimed structure and the function it performs are

different from the prior art”, a finding of “obvious design choice” is precluded under Chu. Applicants further assert that claim 6 is allowable as depending from an allowable base claim.

Accordingly, Applicants respectfully request that the Board reverse the Examiner’s rejection of claim 6.

D. Respecting Group 4: Claims 7–10

For purpose of the appeal, Applicants are satisfied to let claims 8–10 stand or fall together with claim 7 from which they depend. Applicants submit that claim 7–10 are separately patentable from the other pending claims for the following reasons.

The Examiner has rejected claims 8–10 for the reasons stated above relative to claims 1–4. For those claim features recited in claims 7–10 which are also present in respective claims 1–4 Applicants repeat the arguments presented above under heading “A” including all subheadings. In addition, Applicants assert that claim 7 is patentable over the proposed prior art combination of AAPA and Lehman, because claim 7 recites that “at least one of said depressions of said second substrate is disposed within the periphery of said second substrate”, and there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine the reference teachings to provide such feature for the same reasons argued above under heading “A”.

Accordingly, Applicants respectfully request that the Board reverse the Examiner’s rejection of claim 7, as well as claims 8–10 which depend therefrom.

E. Respecting Group 5: Claim 11

Applicants submit that claim 11 is separately patentable from the other pending claims for the following reasons. Applicants repeat the arguments presented above under heading “C” and aver that claim 11 is patentable for at least the same reasons as claim 6. Applicants further assert that claim 11 is patentable as depending from patentable base claim 7. Accordingly, for this additional reason Applicants respectfully request that the Board reverse the Examiner’s rejection of claim 11.

F. Respecting Group 6: Claims 18–20

For purpose of the appeal, Applicants are satisfied to let claims 19–20 stand or fall together with claim 18 from which they depend. Applicants submit that claims 18–20 are separately patentable from the other pending claims for the following reasons.

The Examiner has rejected claims 18–20 for the reasons stated above relative to claims 1–4. Independent claim 18 is a method claim which uses “providing” language to provide structural features that are similar to those recited in claim 1. Accordingly, for those claim features which are recited in claim 18 in a similar manner to those of claim 1, Applicants repeat the arguments presented above under heading “A” including all subheadings. In addition, Applicants assert that claim 18 is patentable over the proposed combination of AAPA and Lehman, because claim 18 recites “aligning the depressions of the alignment member with the alignment elements such that the periphery of the second substrate extends beyond the first substrate and the micro-components disposed on each of said substrates passively align”, and because there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine the reference teachings to provide such feature for the same reasons argued above under heading “A”.

Accordingly, Applicants respectfully request that the Board reverse the Examiner’s rejection of claim 19, as well as claims 18–20 which depend therefrom.

G. Respecting Group 7: Claims 21–22

For purpose of the appeal, Applicants are satisfied to let claim 22 stand or fall together with claim 21 from which it depends. Applicants submit that claims 21–22 are separately patentable from the other pending claims for the following reasons.

The Examiner has rejected claims 21–22 for the reasons stated above relative to claims 1–4. Independent claim 21 is a method claim which uses “providing” language to provide structural features that are similar to those recited in claim 1. Accordingly, for those claim features which are recited in claim 21 in a similar manner to those of claim 1, Applicants repeat the arguments presented above under heading “A” including all subheadings. In addition, Applicants assert that claim 21 is patentable over the proposed combination of AAPA and Lehman, because claim 21 recites “mechanically engaging the first alignment element with the depression disposed on the first

substrate and mechanically engaging the second alignment element with the depression disposed on the second substrate such that micro-components disposed on each of said substrates are aligned” and because there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine the reference teachings to provide such feature for the same reasons argued above under heading “A”.

Accordingly, Applicants respectfully request that the Board reverse the Examiner’s rejection of claim 21, as well as claim 22 which depends therefrom.

Conclusion

In summary, the combined disclosures of AAPA and Lehman clearly fail to provide the requisite factual bases to establish motivation to combine their disclosures so as to arrive at the present invention. Moreover, there is remarkable similarity between the present case and Ex parte Clapp. In each case the Examiner simply cited references to show that various elements were known. Thus, the conclusions in Ex parte Clapp apply to the instant case as well:

Presuming arguendo that the references show the elements or concepts urged by the examiner, the examiner has presented no line of reasoning, and we know of none, as to why the artisan viewing only the collective teachings of the references would have found it obvious to selectively pick and choose various elements and/or concepts from the several references relied on to arrive at the claimed invention. In the instant application, the examiner has done little more than cite references to show that one or more elements or subcombinations thereof, when each is viewed in a vacuum, is known. The claimed invention, however, is clearly directed to a combination of elements. That is to say, appellant does not claim that he has invented one or more new elements but has presented claims to a new combination of elements. To support the conclusion that the claimed combination is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed combination or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references. We find nothing in the references that would expressly or impliedly teach or suggest the modifications urged by the examiner. Additionally, as aforementioned, we find no line of reasoning in the answer, and we know of none, as to why the artisan would have found the modifications urged by the examiner to have been obvious. Based upon the record before us, we are convinced that the artisan would not have found it obvious to selectively pick and choose elements or concepts from the various references so as to arrive at the claimed invention without using the claims as a guide. It is to be noted that simplicity and hindsight are not

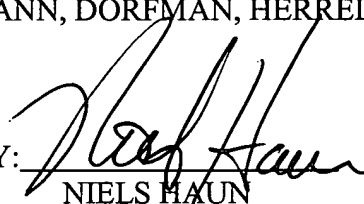
proper criteria for resolving the issue of obviousness.” Ex parte Clapp, 227 USPQ 972, 973 (BPAI 1985).

For all the above reasons, the Examiner has failed to satisfy the criteria for establishing a *prima facie* case of obviousness, as set forth in section 706.02 (j) of the MPEP. Thus, the rejections as set forth in the Final Action cannot be maintained. Ex Parte Wolters, 214 USPQ 735 (BPAI 1979). It is respectfully requested, therefore, that the rejections be reversed and that all pending claims be allowed to Applicants.

Respectfully Submitted,

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APPENDIX: CLAIM LISTING

1. A micro-chip assembly, which comprises:

first and second alignment elements;

a first substrate comprising a front surface which faces a first direction, the front surface comprising at least one micro-component disposed thereon and at least one depression for mechanically engaging one end of the first alignment element;

a second substrate comprising a front surface which faces the first direction, the front surface comprising at least one micro-component disposed thereon and at least one depression for mechanically engaging one end of the second alignment element, said second substrate comprising a periphery which extends beyond the periphery of said first substrate;

a third substrate comprising first and second depressions disposed thereon for engaging the opposite ends of the first and second alignment elements;

wherein said first substrate is disposed between said second substrate and said third substrate; and

whereby said first and second substrates are passively aligned.

2. A micro-chip assembly according to claim 1 wherein at least one of said first and second alignment elements is spherical.

3. A micro-chip assembly according to claim 1 wherein at least one of said first and second alignment elements is a horizontally-disposed cylinder.

4. A micro-chip assembly according to claim 1 wherein said microcomponents of said first and second front surfaces of said first and second substrates are lenses and optical fibers.

5. A micro-chip assembly according to claim 1 wherein at least one of said depressions of at least one of said first substrate, said second substrate and said third substrate is defined between two raised surfaces.

6. A micro-chip assembly according to claim 1 wherein at least one of said depressions of at least one of said first substrate and said second substrate is defined between two raised surfaces.

7. A micro-chip assembly, which comprises:

first and second alignment elements;

a first substrate comprising a front surface which faces a first direction, the front surface comprising at least one micro-component disposed thereon and at least one depression for mechanically engaging one end of the first alignment element;

a second substrate comprising a front surface which faces the first direction, the front surface comprising at least one micro-component disposed thereon and at least one depression for mechanically engaging one end of the second alignment element;

wherein said first substrate is disposed above the front surface of the second substrate and said second substrate comprises a periphery which extends beyond said first substrate; and

wherein at least one of said depressions of said second substrate is disposed within the periphery of said second substrate.

8. A micro-chip assembly according to claim 7 wherein at least one of said first and second alignment elements is spherical.

9. A micro-chip assembly according to claim 7 wherein at least one of said first and second alignment elements is a horizontally-disposed cylinder.

10. A micro-chip assembly according to claim 7 wherein said microcomponents of said first and second front surfaces of said first and second substrates are lenses and optical fibers.

11. A micro-chip assembly according to claim 7 wherein at least one of said depressions of at least one of said first substrate and said second substrate is defined between two raised surfaces.

12-17. (canceled)

18. A method for mechanically aligning micro-components disposed on first and second substrates, comprising the steps of:

providing first and second substrates each comprising micro-components disposed thereon and a front surface comprising at least one depression which faces the same direction;

providing an alignment member comprising:

a first depression for mechanically engaging one end of a first alignment element,
said first alignment element comprising an opposite end which engages a
recess disposed on the front surface of the first substrate, and
at least one second depression for mechanically engaging one end of a second
alignment element, said second alignment element comprising an opposite
end which engages a recess disposed on the front surface of the second
substrate;
positioning the first and second substrates in stacked relation relative to one another such
that the front surfaces face the same direction;
positioning the alignment elements within the recesses disposed within the first and second
substrates; and
aligning the depressions of the alignment member with the alignment elements such that the
periphery of the second substrate extends beyond the first substrate and the micro-
components disposed on each of said substrates passively align.

19. The method according to claim 18 wherein the micro-components align in direct vertical
registry.

20. The method according to claim 18 further comprising the step of:

disengaging said alignment member and said alignment elements with said first and second
substrates.

21. A method for mechanically aligning micro-components disposed on first and second substrates, comprising the steps of:

providing first and second substrates each comprising at least one micro-component disposed on a front surface that comprises at least one depression disposed thereon which faces a first direction, said second substrate comprising a periphery which extends beyond said first substrate;

providing an alignment member comprising a first alignment element for mechanically engaging the depression disposed on the front surface of the first substrate and at least one second alignment element for mechanically engaging the depression disposed on the front surface of the second substrate;

positioning the first and second substrates in stacked relation relative to one another such that the front surfaces face said first direction and said periphery of said second substrate extends beyond said first substrate; and

mechanically engaging the first alignment element with the depression disposed on the first substrate and mechanically engaging the second alignment element with the depression disposed on the second substrate such that micro-components disposed on each of said substrates are aligned.

22. The method according to claim 21 further comprising the step of:

disengaging said alignment member and said alignment elements with the depressions of said first and second substrates.

23. (Canceled)